

EPA Tools and Resources Webinar: Data Management Tools for Emergency Response

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¹US EPA Office of Research and Development

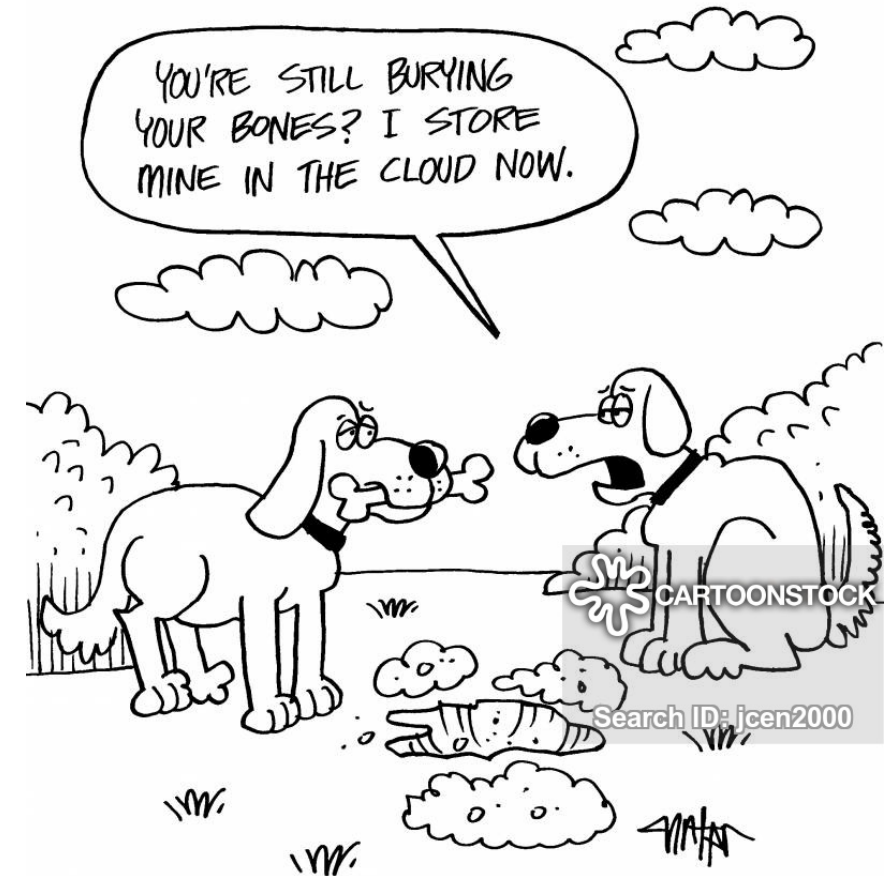
²UE EPA Office of Land and Emergency Management

Thursday, August 10th, 2023



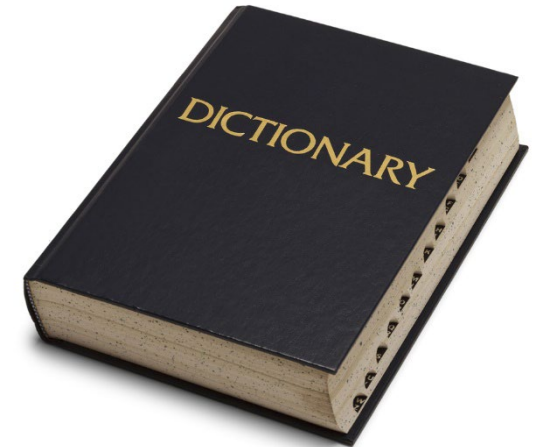
Presentation Outline

- Data management basics
- Application to contamination incidents
- Technologies and best practices
- Case study
- Parting thoughts



Data Management - The Basics

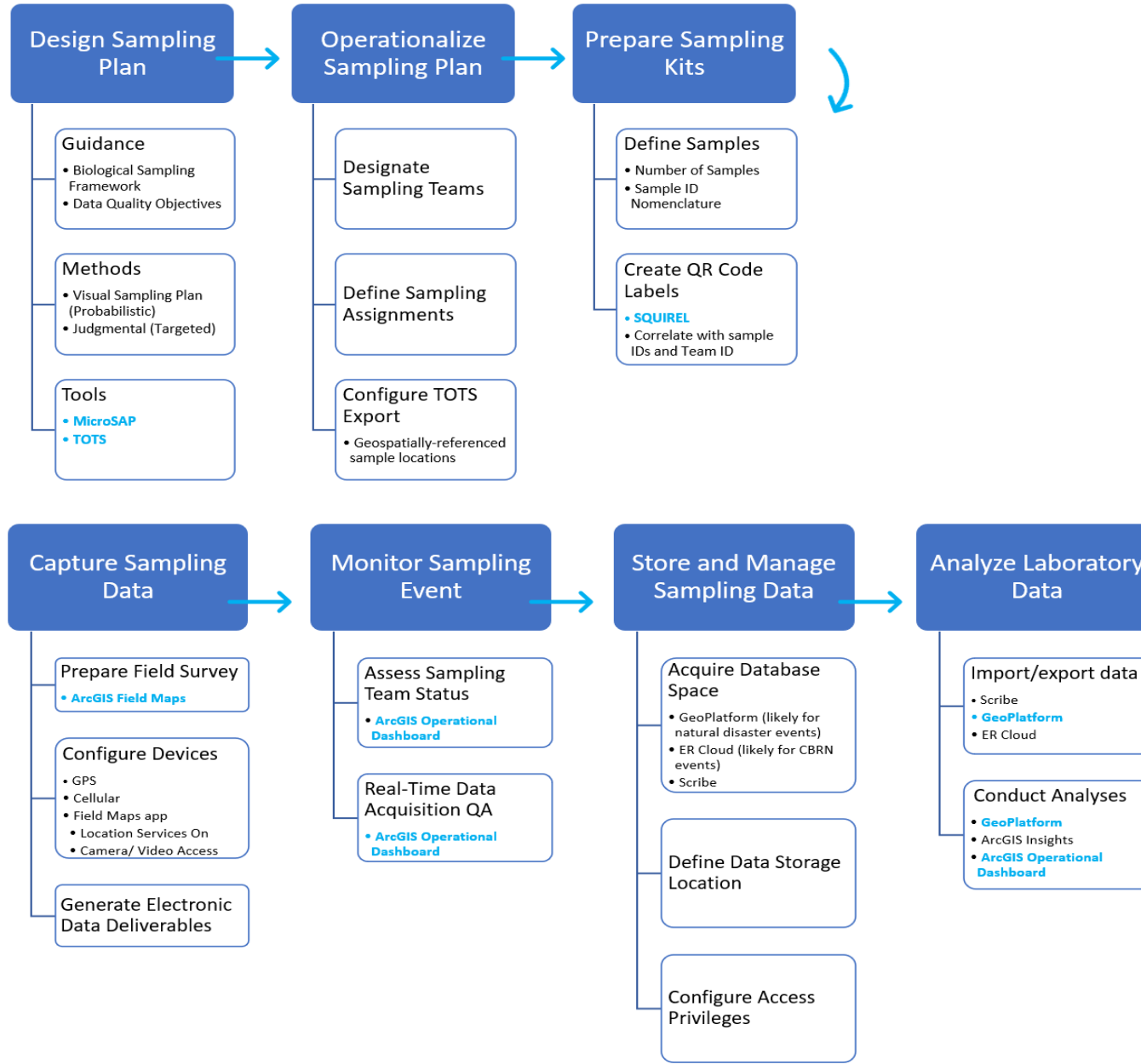
- ◆ **Data** - Data are facts and statistics collected for reference or analysis, representing the qualitative or quantitative attributes of a variable or set of variables.
- ◆ **Data Management** - practice of collecting, storing, and using data
- ◆ **Data Management Plan**: standard methods for data collection, management, reporting, and visualization practices
- ◆ **Data Management & Environmental Sampling**: data management plays a crucial role in environmental sampling as it ensures the quality and integrity of data collected from the environment.



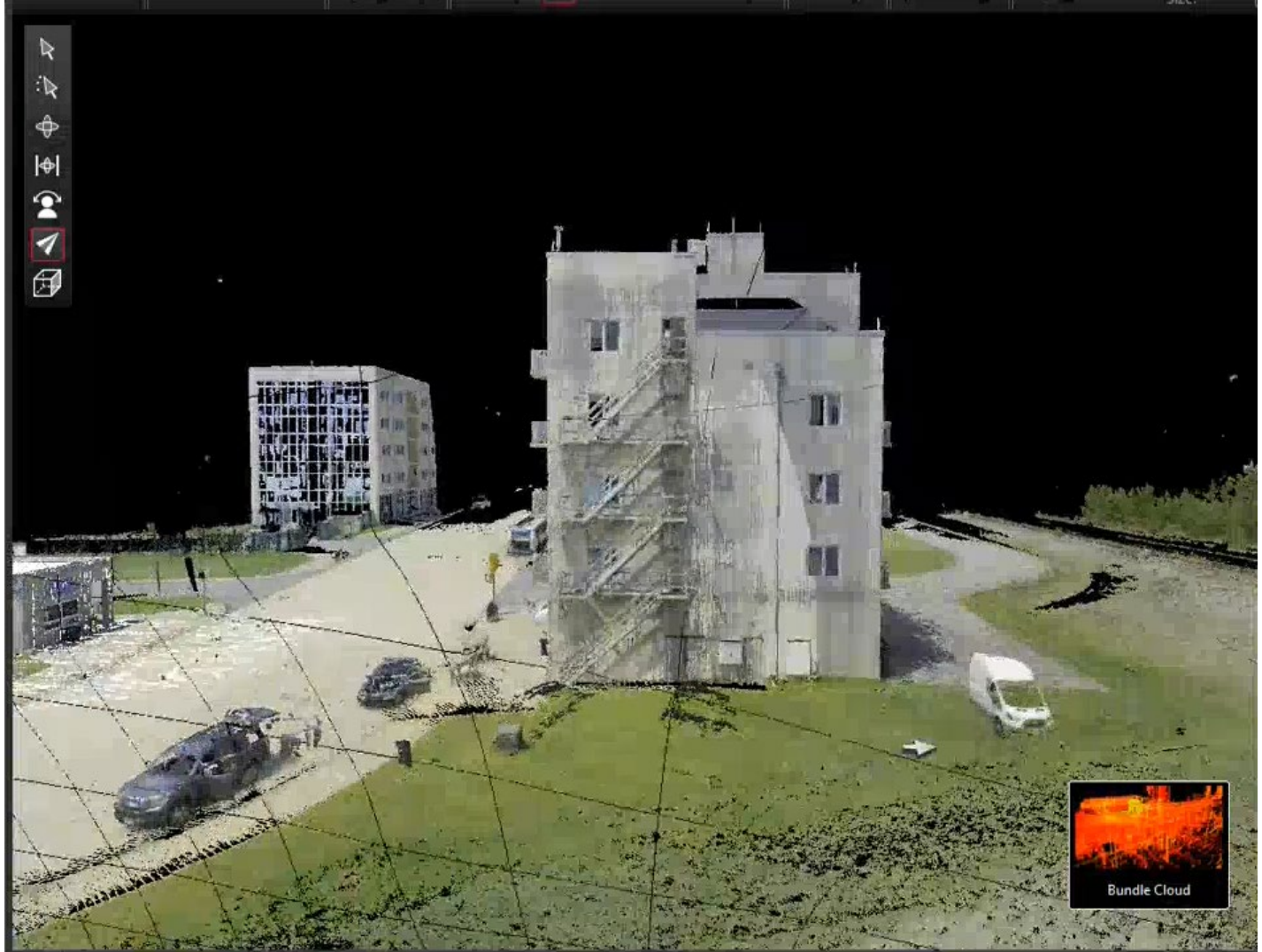
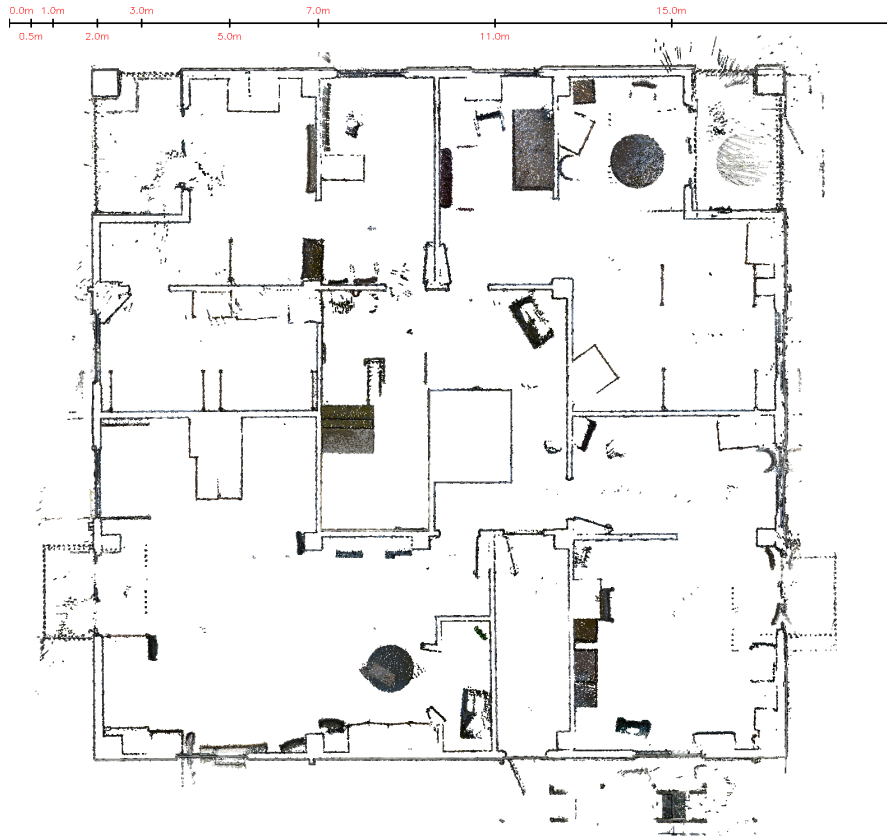
CBR & Data Management

- ◆ Chemical, Biological, or Radiological (CBR) incidents can introduce many challenges when managing data
- ◆ A substantial amount of data will need to be collected, checked for quality, and maintained in order to support decision-making
- ◆ Depending on the size and scope of the incident, such an undertaking could continue for many years or decades
- ◆ Types of data collected during a CBR response could include:
 - » Sample location
 - » Sample matrix
 - » Sampling method
 - » Time and date of sample collection
 - » Picture or video evidence
 - » Sample collection personnel or team,
 - » Laboratory processing the analysis,
 - » Analysis results,
 - » Mapping data (e.g., Global Positioning Systems [GPS], light detection and ranging [LiDAR], photogrammetry),
 - » Documentation of quality assurance activities, and
 - » Decontamination method

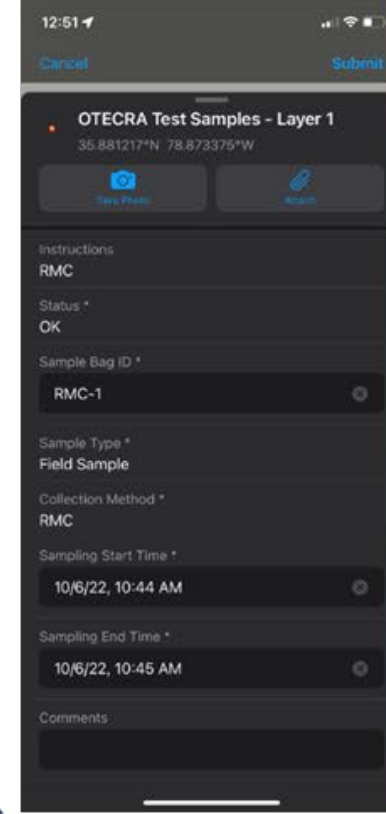
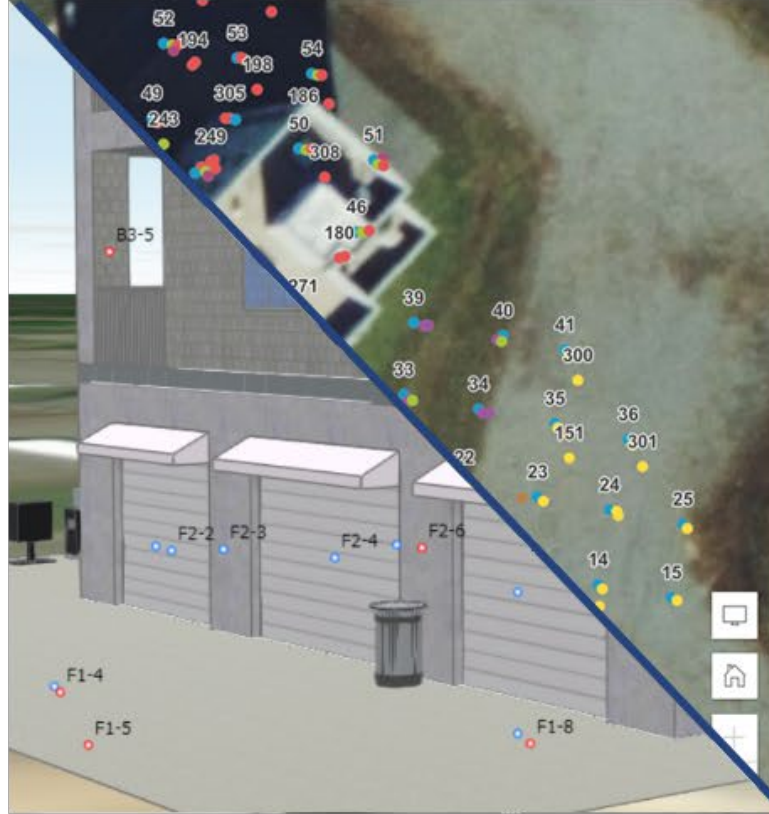
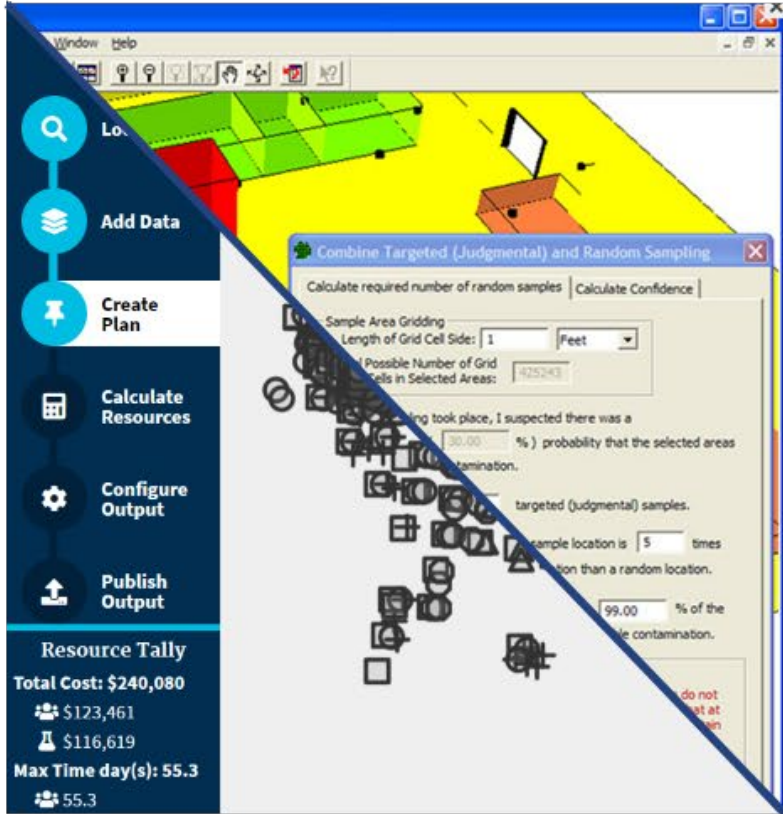
Sample Planning/Data Management



Site Mapping (Recon)



Sample Plan Design

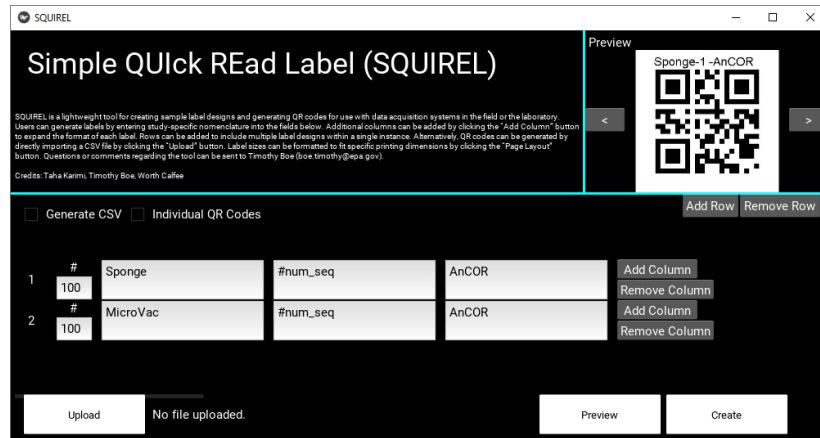


Determine Sampling Goals & Cost/Time Feasibility
Trade-off Tool for Sampling/Visual Sampling Plan

Define Data Fields & Validate Spatial Data
ArcPro, ESRI Cloud

Operationalize Sampling Plan & Capture Sampling Data
Survey123, Field Maps, ESRI Cloud

Sample Kit Preparation: Simple QUIck REad Label (SQUIREL)



SQUIREL

Simple QUIck REad Label (SQUIREL)

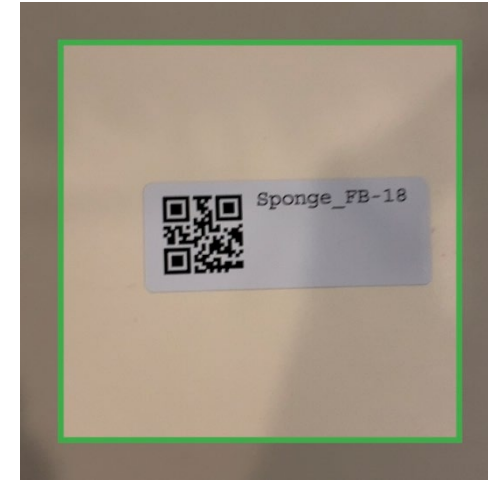
SQUIREL is a lightweight tool for creating sample label designs and generating QR codes for use with data acquisition systems in the field or the laboratory. Users can generate labels by entering study-specific nomenclature into the fields below. Additional columns can be added by clicking the "Add Column" button to expand the format of each label. Rows can be added to include multiple label designs within a single instance. Alternatively, QR codes can be generated by directly importing a CSV file by clicking the "Upload" button. Label sizes can be formatted to fit specific printing dimensions by clicking the "Page Layout" button. Questions or comments regarding the tool can be sent to Timothy Bore (bore.timothy@epa.gov).

Credits: Taha Karimi, Timothy Bore, Worth Caffee

Generate CSV Individual QR Codes

#	Sample Name	#num_seq	AnCOR	
1	Sponge		AnCOR	Add Column
				Remove Column
2	MicroVac	#num_seq	AnCOR	Add Column
				Remove Column

Upload No file uploaded. Preview Create



Create Naming Scheme Per Total Number of Samples

Export to PDF & Print to Labels

Scan QR Code

Hardware Deployment & Management



Submeter GPS

Protective Covering

iPad mini

Pole Mount & iPad Case

QR Code

GPS Pole



GPS
Bin

Tablet Setup and Charging
Station

Monitoring
Station

Data
Management
Station



Data Acquisition

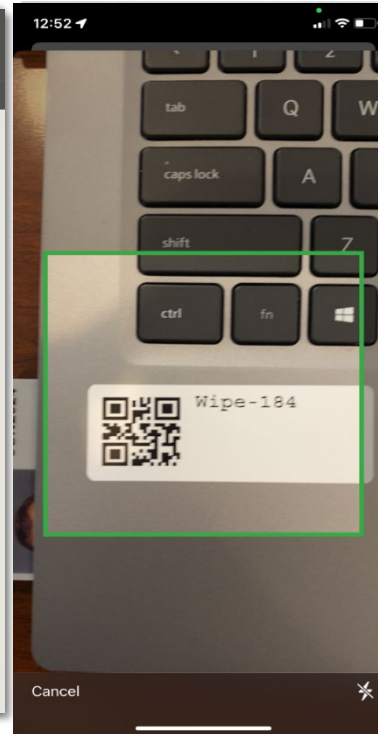
Sequencing



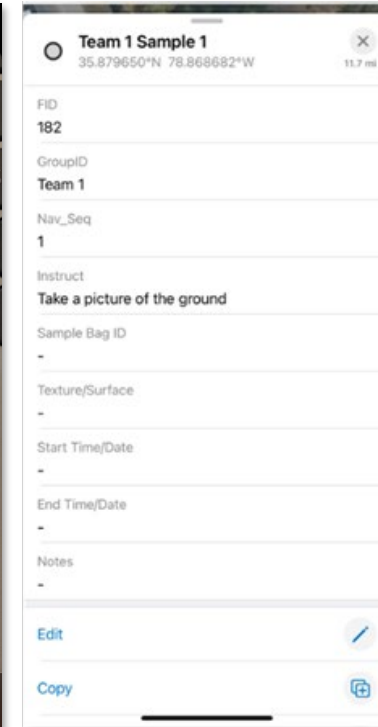
Navigation



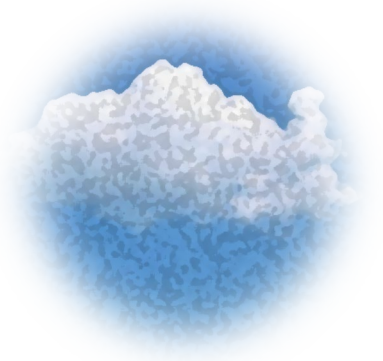
Data Entry



Error Checking



The Cloud




Monitoring Sample Event

◀ 39 of 40 ▶

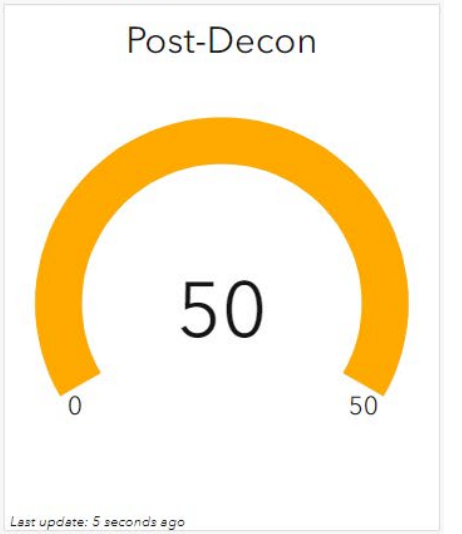
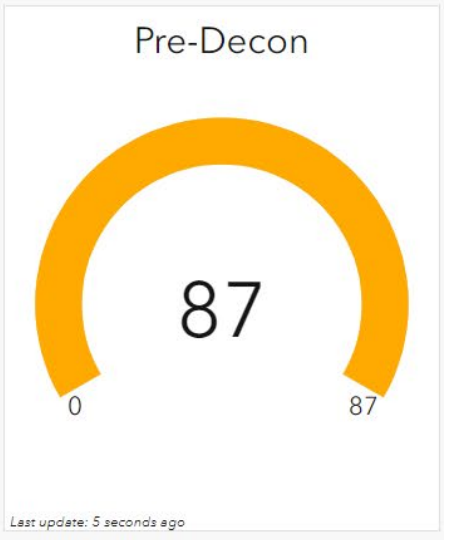
Most Recent Picture

89



Last update: 5 seconds ago

- ### Collected Samples
- Team 7 - Sample 68
WetVac-19 - 11/4/2022, 9:59:23 AM
 - Team 6 - Sample 45
WetVac-18 - 11/4/2022, 10:01:40 AM
 - Team 7 - Sample 135
WetVac_FB-10 - 11/4/2022, 9:56:03 AM
 - Team 6 - Sample 47
Wipe-146 - 11/4/2022, 9:56:55 AM
 - Team 8 - Sample 100
WetVac-20 - 11/4/2022, 9:49:43 AM
 - Team 6 - Sample 49
Wipe-133 - 11/4/2022, 9:54:00 AM
- Last update: 5 seconds ago



Chain of Custody



COCPDF Tool

Select a storage location

Provide the location of the sampling site

ANCHOR DATE

Contact Person Name Contact #

Area Number 440-529-0287

Select the CSV with the sample data

Select CSV file

QR Scan Add Samples Settings Exit

Launch COC PDF Tool, fill out site details, and select sample csv



COCPDF Tool

CSV Selected: AP_HH_Feb_Base_long.csv
2136

QR Scan Add Samples Settings Exit

Select mode for adding individual samples



COCPDF Tool

CSV Selected: DFU May 12.csv
12

Select the lab for this selection of data
Select from the dropdown below

Select Lab

- EPH - Jacksonville
- SHL University of Iowa
- WYOH - Wadsworth Center
- VA DOLS
- CDC/OSU/NCEZ/DSR
- CDC/OSU/NCEZ/SPH
- U.S. EPA
- CDC/OSU/NCEZ/CHCPP (Business)

QR Scan Add Samples Settings Exit

Select lab then open camera for QR Scanner



COCPDF Tool

CSV Selected: DFU May 12.csv
12

Select the lab for this selection of data
Select from the dropdown below

U.S. EPA

10

Select Collection Method

Submit Cancel

QR Scan Add Samples Settings Exit

Select lab then fill out details for samples to auto-populate into tool

The tool recalls which samples have been used, ensuring they can't be scanned or auto-populated again



COCPDF Tool

CSV Selected: DFU May 12.csv
12

Sample ID Remove Sample

1 DFU-22

2 DFU-37

3 DFU-29

4 DFU-46

5 DFU-36

6 DFU-36

7 DFU-23

QR Scan Add Samples Settings Exit

Once all samples are added, generate the forms

COC PDF Results:

Page 1 of 2

U.S. EPA
Chain of Custody
Anchor Date: 5/12/2012
Lab Contact: Denise Isbell
EPA Contact: Anna Burkar: 440-529-0287

Case #
Lab: U.S. EPA
Lab Phone: 919-541-3259

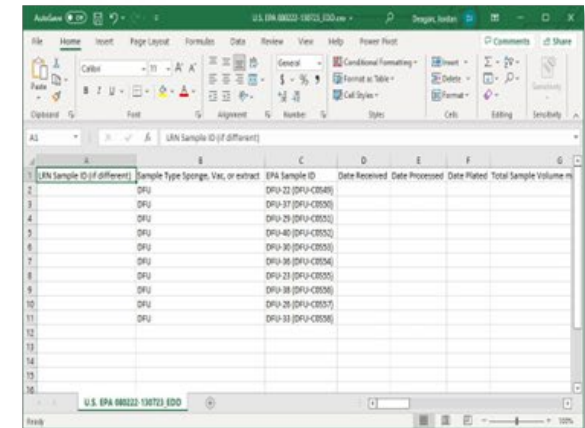
Label	Sample #	Collection Method	Sample Type	Collected	Time Collected	Matrix Code	Container	Preservation
	DFU-22 (DFU-CB545)	DFU	Field Sample	5/12/2012	11:59:33	1	50 mL, conical tube	Ice Pack
	DFU-37 (DFU-CB555)	DFU	Field Sample	5/12/2012	12:33:14	1	50 mL, conical tube	Ice Pack
	DFU-29 (DFU-CB551)	DFU	Field Sample	5/12/2012	12:03:00	1	50 mL, conical tube	Ice Pack
	DFU-46 (DFU-CB552)	DFU	Field Sample	5/12/2012	12:04:33	1	50 mL, conical tube	Ice Pack
	DFU-36 (DFU-CB553)	DFU	Field Sample	5/12/2012	12:07:48	1	50 mL, conical tube	Ice Pack
	DFU-36 (DFU-CB554)	DFU	Field Sample	5/12/2012	12:09:58	1	50 mL, conical tube	Ice Pack

Special Instructions

Signature

Name/Phone	Requested by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition (Open/Seal)

EDD CSV



LN Sample ID (if different)	Sample Type	Sponge, Vac, or extract	EPA Sample ID	Date Received	Date Processed	Date Plated	Total Sample Volume in
DFU	DFU		DFU-22 (DFU-CB545)				
DFU	DFU		DFU-37 (DFU-CB555)				
DFU	DFU		DFU-29 (DFU-CB551)				
DFU	DFU		DFU-46 (DFU-CB552)				
DFU	DFU		DFU-36 (DFU-CB553)				
DFU	DFU		DFU-36 (DFU-CB554)				
DFU	DFU		DFU-23 (DFU-CB550)				
DFU	DFU		DFU-38 (DFU-CB556)				
DFU	DFU		DFU-26 (DFU-CB557)				
DFU	DFU		DFU-33 (DFU-CB558)				

Case Study:

Operational Testing and Evaluation of Chemical Remediation Activities (OTECRA)

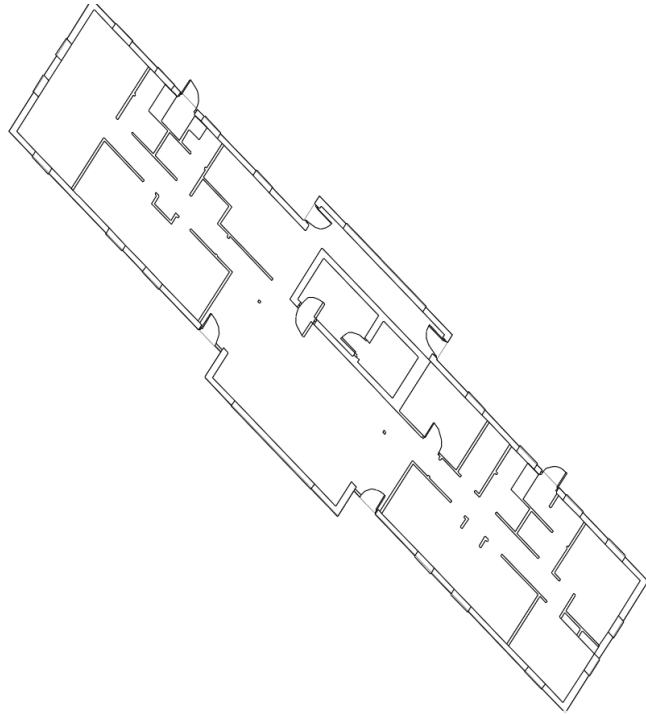
Operational Testing and Evaluation of Chemical Remediation Activities (OTECRA)

OTECRA is a full-scale exercise conducted by CMAD, CESER and the EPA Regions to evaluate the operational effectiveness of sampling and analytical methods and decontamination approaches in an indoor facility following the release of a highly toxic and persistent chemical warfare agent.

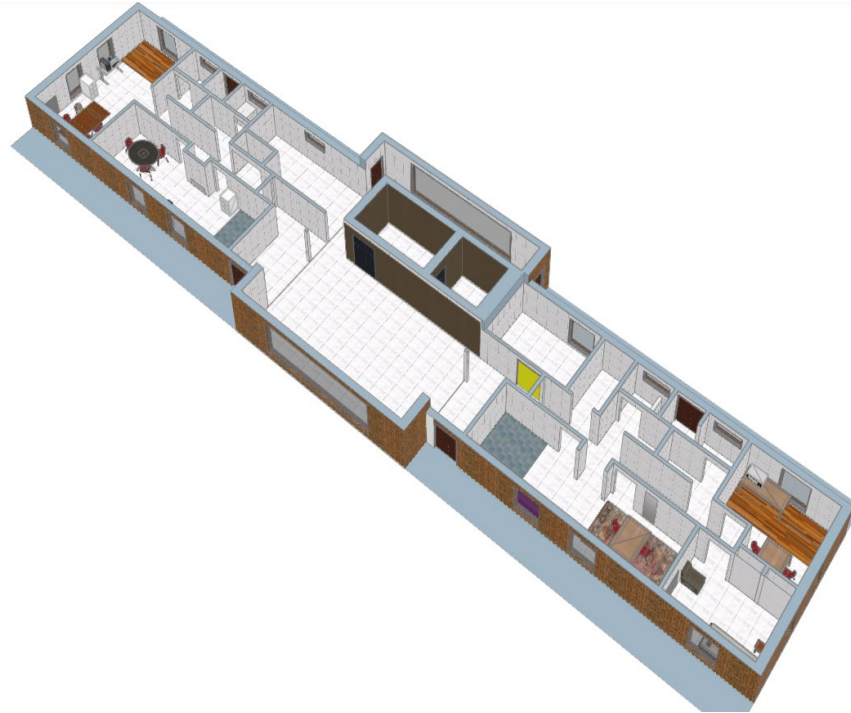
- ◆ Malathion used as simulant for persistent nerve agent (VX)
- ◆ Test newly developed chemical sampling and analysis methods, such as a wet vacuum sampler
- ◆ Assess decontamination technologies at the full-scale
- ◆ Test the use of QR codes to manage samples and to streamline data management and chain of custody, following samples through decon line to field or off-site laboratories



OTECRA: Sample Design



Convert CAD to GIS friendly format; project to coordinate system



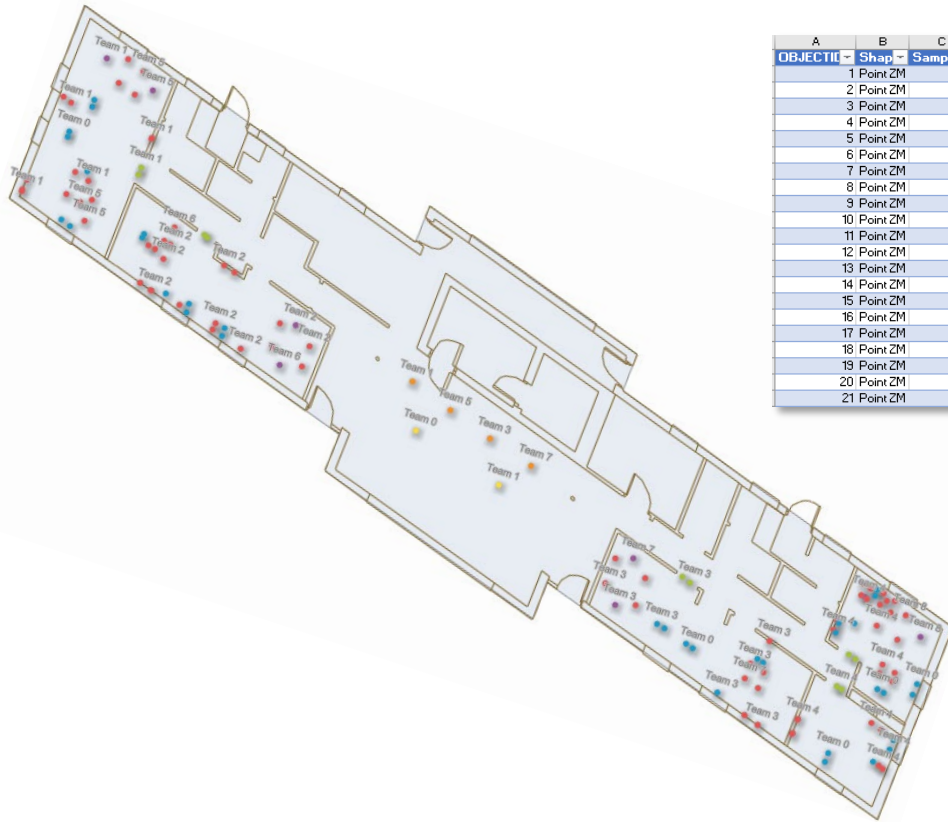
Extrude map to 3D form; add textures, content



Transition to web-based platform; use for interactive planning



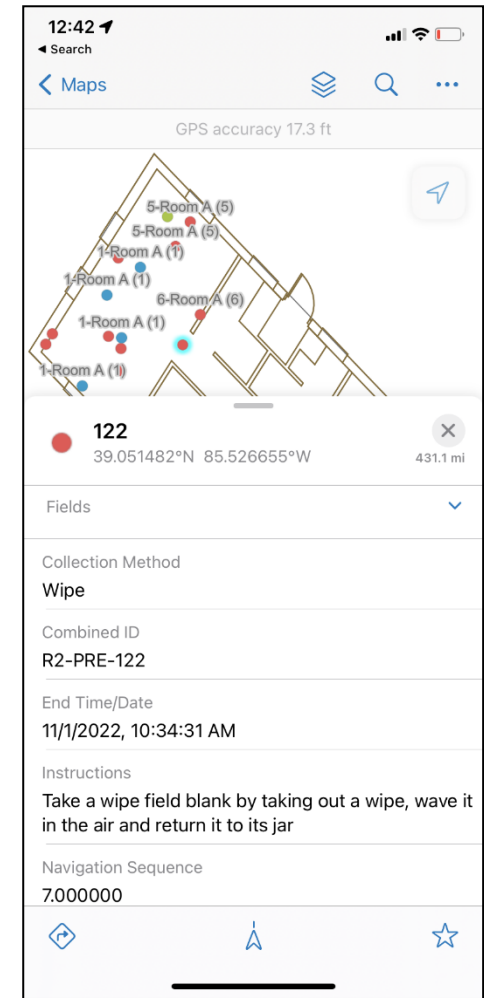
OTECRA: Data Design



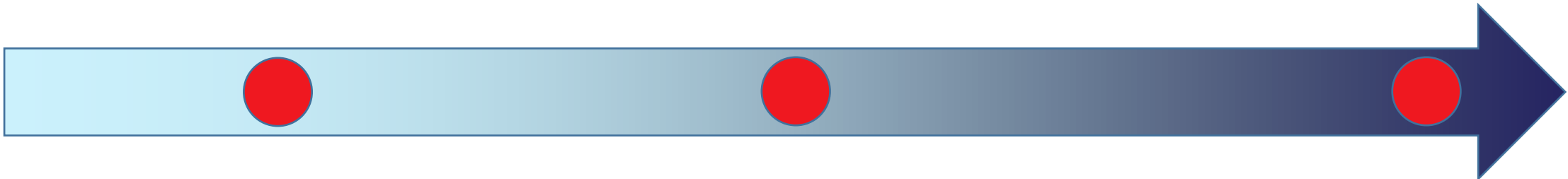
Enable 2D web-map version for data acquisition compatibility

A	B	C	D	E	F	G	H	I	J
OBJECTID	Shape	Sample	Team	Combine	Room	Instructions	Collection Method	Sample 1	Targeted Surface
1	Point ZM	1	1	R2-PRE-1	Room A	Take a 12x12-in wipe sample on the drywall; use red tape as a guide - top left	Wipe	Field Sample	Painted drywall
2	Point ZM	2	5	R2-POST-2	Room A	Take a 12x12-in wipe sample on the drywall; use black tape as a guide; bottom	Wipe	Field Sample	Painted drywall
3	Point ZM	3	5	R2-POST-3	Room A	Take a 12x12-in wipe sample on the drywall; use black tape as a guide; top	Wipe	Field Sample	Painted drywall
4	Point ZM	4	1	R2-PRE-4	Room A	Take a 12x12-in wipe sample on the drywall; use red tape as a guide - bottom	Wipe	Field Sample	Painted drywall
5	Point ZM	5	1	R2-PRE-5	Room A	Take a 12x12-in wipe sample on the mirror; use red tape as a guide	Wipe	Field Sample	Glass/Mirror
6	Point ZM	6	5	R2-POST-6	Room A	Take a 12x12-in wipe sample on the mirror; use black tape as a guide	Wipe	Field Sample	Glass/Mirror
7	Point ZM	7	1	R2-PRE-7	Room A	Take a 12x12-in wipe sample on the table; use red tape as a guide	Wipe	Field Sample	Table
8	Point ZM	8	1	R2-PRE-8	Room A	Take a 12x12-in wipe sample on the table; outside the marked areas	Wipe	Field Sample	Table
9	Point ZM	9	5	R2-POST-9	Room A	Take a 12x12-in wipe sample on the table; use black tape as a guide	Wipe	Field Sample	Table
10	Point ZM	10	5	R2-POST-10	Room A	Take a 12x12-in wipe sample on the table; outside a marked area	Wipe	Field Sample	Table
11	Point ZM	11	1	R2-PRE-11	Room A	Take a 12x12-in wipe sample on the seat of the chair; use red tape as a guide	Wipe	Field Sample	Chair seat
12	Point ZM	12	5	R2-POST-12	Room A	Take a 12x12-in wipe sample on the seat of the chair; use black tape as a guide	Wipe	Field Sample	Chair seat
13	Point ZM	13	1	R2-PRE-13	Room A	Take a wipe sample (vertical) on the right side of the PC case; wipe whole	Wipe	Field Sample	PC Case
14	Point ZM	14	5	R2-POST-14	Room A	Take a wipe sample (vertical) on the left side of the PC case; wipe whole	Wipe	Field Sample	PC Case
15	Point ZM	15	5	R2-POST-15	Room A	Take a 3x3-foot wet vacuum sample on the floor; use the black tape as a guide	Wipe	Field Sample	Flooring element
16	Point ZM	16	1	R2-PRE-16	Room A	Take a 3x3-foot wet vacuum sample on the floor; use the red tape as a guide	Wipe	Field Sample	Flooring element
17	Point ZM	17	5	R2-POST-17	Room A	Take a 12x12-in wipe sample on the floor; use the black tape as a guide	Wipe	Field Sample	Flooring element
18	Point ZM	18	1	R2-PRE-18	Room A	Take a 12x12-in wipe sample on the floor; use the red tape as a guide	Wipe	Field Sample	Flooring element
19	Point ZM	19	5	R2-POST-19	Room A	Take a 12x12-in wipe sample on the floor; outside the marked areas in the	Wipe	Field Sample	Flooring element
20	Point ZM	20	1	R2-PRE-20	Room A	Take a 12x12-in wipe sample on the floor; outside the marked areas in the	Wipe	Field Sample	Flooring element
21	Point ZM	21	0	R2-PRE-21	Room A	Pick up the RMC from tile floor in front of PC desk using a clean forceps. Place	Wipe	Field Sample	RMC

Extrapolate attribute fields for “data refinement”; rejoin data



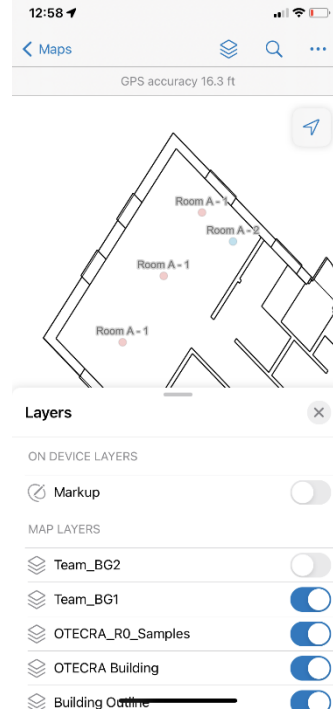
Stand-up sampling form; code fields; duplicate form as needed



OTECRA: Operations



Established mobile data unit;
provided network connectivity



Mobile 3D map and sampling form
used to support navigation and
data entry



Status of collection efforts
monitored using dashboard

OTECRA: Operations



OBJECT_ID	Sample ID	Team ID	Combined ID	Room ID	Instructions	Collection Method	Sample Type	Targeted Surface
21	21	0.000000	R2-PRE-21	Room A	Pick up the RVC from the floor in Room A. Use a clean wipe. Place in Digilube and cap.	RVC	Field Sample	RVC
23	23	0.000000	R2-PRE-23	Room A	Pick up the RVC from the floor in Room A. Use a clean wipe. Place in Digilube and cap.	RVC	Field Sample	RVC
25	25	0.000000	R2-PRE-25	Room A	Pick up the RVC from the floor in Room A. Use a clean wipe. Place in Digilube and cap.	RVC	Field Sample	RVC

Samp_No	Lab_Locat	Matrix_ID	Sample_T	Lab_Coc_ID	Date_Coll	Date_Recr	Date_Extr	Date_Ana	Lab_Name	Lab_Samp	Lab_Batch	Analysis	Analys
2	Wipe-137	PHILIS Lab onsite			11/4/2022	9:33:36			PHILIS Lab onsite				
3	Wipe-138	PHILIS Lab onsite			11/4/2022	9:36:44			PHILIS Lab onsite				
4	Wipe-164	PHILIS Lab onsite			11/4/2022	9:47:40			PHILIS Lab onsite				
5	Wipe-168	PHILIS Lab onsite			11/4/2022	9:30:39			PHILIS Lab onsite				
6	Wipe-172	PHILIS Lab onsite			11/4/2022	9:50:45			PHILIS Lab onsite				
7	Wipe-145	PHILIS Lab onsite			11/4/2022	9:41:57			PHILIS Lab onsite				
8	Wipe-165	PHILIS Lab onsite			11/4/2022	9:39:13			PHILIS Lab onsite				
9	Wipe-136	PHILIS Lab onsite			11/4/2022	9:45:00			PHILIS Lab onsite				
10	Wipe-146	PHILIS Lab onsite			11/4/2022	9:56:55			PHILIS Lab onsite				
11	Wipe-133	PHILIS Lab onsite			11/4/2022	9:54:00			PHILIS Lab onsite				
12	Wipe_FB	PHILIS Lab onsite			11/4/2022	9:28:35			PHILIS Lab onsite				



Samples undergo decon at egress; accountability checks;

Scan QR code or export by team ID; convert to CSV format

Page 1 of 2

USEPA
Date/Time: OTECRA Round 2 Team 6 Wipe Samples 11/4/2022
Carrier Name: Lab Contact: Sang Chung
Artid/No: EPA Contact: Anne Busher, 440-539-0787

No: 110422-102304
Cooler #: Lab: PHILIS Lab onsite
Lab Phone: 219-477-8860

Lab#	Sample #	Collection Method	Sample Type	Collected	Time Collected	Numb. Cost	Container	Preservative
	Wipe-137 (R2-POST-29)	Wipe	Field Sample	11/4/2022	9:33:36	1	4 oz. glass jar	Ice Pack
	Wipe-138 (R2-POST-31)	Wipe	Field Sample	11/4/2022	9:36:44	1	4 oz. glass jar	Ice Pack
	Wipe-164 (R2-POST-33)	Wipe	Field Sample	11/4/2022	9:47:40	1	4 oz. glass jar	Ice Pack
	Wipe-168 (R2-POST-35)	Wipe	Field Sample	11/4/2022	9:30:39	1	4 oz. glass jar	Ice Pack
	Wipe-172 (R2-POST-37)	Wipe	Field Sample	11/4/2022	9:50:45	1	4 oz. glass jar	Ice Pack
	Wipe-145 (R2-POST-40)	Wipe	Field Sample	11/4/2022	9:41:57	1	4 oz. glass jar	Ice Pack

Special Instructions: HAZMAT #

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt

Generate EDD and COC form; using COC form



Sample Transfer

- ◆ Onsite presence of PHILIS led to transfer of WIPE samples in cooler (one cooler per team / ~ 12 samples; no lock used) to the sample processing room (SPR) for immediate processing
- ◆ Content of cooler was verified against CoC before hand delivery to PHILIS
- ◆ Back at the decon line: Cooler with LIQUID samples was kept under lock (zip tie) and unlocked/locked each time a set of samples was added
- ◆ Cooler was taken to SPR. Content of cooler was verified against CoC before storage in refrigerator and (later) shipment to external laboratory



Conclusion

- ◆ Data management goes beyond record keeping
- ◆ Plan/implement left of the “boom”
- ◆ Share examples, experiences, & solutions
- ◆ Contamination incidents (especially CBRN) complicate the data management process
- ◆ Research and technology are constantly evolving
- ◆ Guidance documents, frameworks, & tools are your friends



Contact

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Homeland Security and Materials Management Division

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